
NEIGHBORHOOD

TRAFFIC

CALMING

RECOMMENDED PRACTICES

**CITY OF INDIANAPOLIS
DEPARTMENT OF CAPITAL ASSET MANAGEMENT**

June, 1999



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The following document identifies recommended practices for the planning, design, and construction of neighborhood traffic calming devices for the City of Indianapolis. This document will be subject to change, and will require revisions, up dates, and/or supplements, as new knowledge becomes available in the field of traffic calming.

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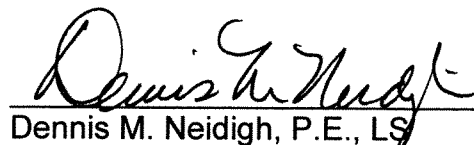
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1. PURPOSE

The purpose of this document is to set forth the recommended practices in planning, designing and constructing neighborhood traffic calming devices throughout the City of Indianapolis, Indiana. Likewise it is important to establish the following definition of traffic calming (this definition was derived by the subcommittee on Traffic Calming of the Institute of Transportation Engineers in 1997):

“Traffic Calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users.”

The primary objective of traffic calming is to create safer roads and a better quality of life for the neighborhoods that we live in. The strategic objectives are:

- to improve driver behavior, concentration, and awareness,
- to reduce speed
- to reduce cut-through traffic
- to improve safety for pedestrians, bicycles, and vehicles, and
- to enhance the quality of life, and improve aesthetics

These recommended practices provide the consistency needed in reviewing these requests. The practices identified herein have been obtained from various references on traffic calming including the following: “*Guidelines for the Design and Application of Speed Humps*”, prepared by ITE Technical Council Speed Humps Task Force; “*Traffic Calming in Practice*”, prepared by County Surveyors Society, Department of Transport, Association of Metropolitan District Engineers, Association of London Borough Engineers and Surveyors, Association of Chief Technical Officers; “*Traffic Calming*”, American Planning Association, Planning Advisory Service Report Number 456; “*The Traffic Safety Toolbox, a Primer on Traffic Safety*”, Institute of Transportation Engineers, “*Traffic Calming Primer*”, Pat Noyes and Associates, and “*Canadian Guide to Neighborhood Traffic Calming*”, Transportation Association of Canada.

The following is a brief outline of the elements contained in the process for investigating the need for neighborhood traffic calming. Also included in this document is a list of alternative traffic calming measure which describes the measure, and the conditions and circumstances for their use. This document will also be incorporated in the City of Indianapolis Street Standards for new subdivisions.

2. PLANNING

Appropriate neighborhood traffic control devices should only be installed to address documented safety or traffic concerns supported by traffic engineering studies. These studies will include an examination of the full array of potential improvement actions beginning with a recommendation to law officials for better enforcement of existing controls. The City's Traffic Engineering staff will use the following procedures in order to determine the need for traffic calming for each neighborhood request. Data will be collected and analyzed by the City staff, and the data will be compared with established criteria to determine if the location is eligible for consideration, and findings and conclusions will be documented in a formal report.

- Citizen Support
- Traffic Advisory Committee
- Street Classification
- Traffic Volumes
- Traffic Speeds
- Geometric Data
- Accident History
- Public Safety Agencies Input
- Alternative Traffic Calming Measures
- Implementation Plan
- Final Report Approval
- Evaluation Plan

Citizen Support

Before any neighborhood traffic calming devices can be installed, **75 percent of the residents directly affected by the installation of the device should be in support of the action.** If the neighborhood has an association, they should support the request. After the investigation is complete, all potentially affected residents will be invited to information meetings, and will have an opportunity to provide input. Alternative methods of traffic calming should be discussed. Citizens decide whether or not to continue the process.

Traffic Advisory Committee

A traffic advisory committee that includes neighborhood representatives and City staff should be established to effectively involve the community. The role of this committee is to assist in the development of the plan, and to monitor the plan after it has been implemented.

Street Classification

Typically, streets classified as “**local**” or “**local collector**” shall be considered for neighborhood traffic control device applications. In general, the streets eligible for consideration will provide direct access to abutting lands, connect to higher classification streets, offer the lowest level of mobility, contain few, if any bus routes and will deliberately discourage service to through traffic movement. In addition, the streets in consideration should be residential in nature. “Arterial” streets are eligible candidates for certain types of traffic calming, i.e. curb extensions, roundabouts, turn restrictions, and pedestrian refuge islands. Speed humps are limited to local or local collector streets.

Traffic Volumes

Neighborhood traffic calming devices should typically be installed on **streets with less than 2,000 vehicles per day**. Special studies and justification may show that neighborhood traffic calming devices are warranted for streets with traffic volumes outside of this range.

Traffic Speeds

Neighborhood traffic calming devices should generally be installed on streets where the **85th percentile speed is 35 mph or greater**.

Geometric Data

Neighborhood traffic calming devices should normally be used on streets **with no more than two travel lanes, or where the overall pavement is no more than 40 feet**. In addition, the pavement should have good surface and drainage qualities.

Accident History

Prior to the installation of any neighborhood traffic-calming device, a study must be completed, using solid engineering judgment that the installation of the device will not result in a situation that is less safe than the original condition. **Three-year accident history** should be reviewed to assist in identifying problems.

Public Safety Agency Input

Public Safety agencies will be contacted to determine if services for emergency vehicles will be affected by the proposed changes.

Alternative Traffic Calming Measures

The following is list of alternative measures that should be considered and discussed with the petitioners. A description of these alternatives, which describes the measures, and conditions and circumstances for their use, begins on page 6.

- Stop Signs
- Turn Restrictions
- One-Way Streets
- Arterial Street Improvements / Signal Progression
- Rumble Strips or Change in Roadway Surface
- Speed Humps
- Pedestrian Refuge Islands
- Street Narrowing / Curb Extension
- Curb Radius Reduction
- Chicanes
- Traffic Circles/Roundabouts
- Diverters
- Street Closures

Implementation Plan

Once the neighborhood traffic calming measures have been selected, cost estimates will be prepared. The selected alternatives will be constructed based on priority as funding allows and is subject to work crew schedules and appropriate weather conditions.

Final Report Approval

Before the final report can be approved a neighborhood meeting will be required to review the results of the study and to consider alternative traffic calming measures for the neighborhood. The affected residents must support the proposed plan before final approval by the Director of the Department of Capital Asset Management.

Evaluation Report

An evaluation of the project effectiveness will be conducted within one year after implementation. At a minimum, speeds, accidents, and traffic volumes will be reviewed.

Summary

The three principal elements in determining the need to implement traffic calming in a neighborhood are Citizen Support (75 percent of residents directly affected), Speed (85th percentile speed is 35 mph or greater), and Daily Traffic Volumes that clearly show that vehicles are using the local street as a cut through. The petition is the key element, however, if the traffic study shows that public safety, and also shows that the neighborhood is threatened by excessive speed and / or cut through traffic, it may be in the best interest of the City to accept a petition with less than 75 percent support. A typical example would be failure of certain residents to respond to repeated requests from neighborhood leaders to vote for or against the proposed traffic-calming device. However, those residents responding in favor of the change should represent 75 percent of the total responding.

In summary, traffic calming aims to give you the best of both worlds - mobility and a better quality of life. Clearly traffic calming is not a narrow concept. It involves vehicles, neighborhood support, classification of streets, and education of residents. It is a planning approach that is aimed at improving the quality of life. It involves a whole new attitude and outlook.

3. DESCRIPTION OF ALTERNATIVES

There are two types of traffic calming techniques, passive controls and active controls. **Passive** controls are primarily traffic signs, i.e., stop signs, turn restrictions, one-way streets. **Active** controls change driver behavior and are therefore self-enforcing, i.e., speed humps, rumble strips, median barriers, diverters, slow point or chokers, street closures, traffic circles, chicanes, and street narrowing. Figure 1 provides an outline of the benefits and disbenefits of the various traffic calming alternatives. Examples of these “active” traffic-calming techniques are shown in Figures 2 through 13. The following describes each alternative, and describes the conditions and circumstances for their use.

Stop Signs

Stop signs will decrease the speed at the intersections, which are the locations where most accidents occur. This type of device has a positive effect on the neighborhood. This device will require periodic enforcement or the stop signs will lose their effectiveness, since motorists tend to disregard them.

Turn Restrictions

No right turn or no left turn signs can be installed to prevent turning movements onto neighborhood streets. This will eliminate cut through traffic in a neighborhood particularly in the peak periods. A negative aspect will be the inconvenience to the residents, and to be effective enforcement may be required.

One-Way Streets

One-Way streets can be used to make it difficult for vehicles to cut through neighborhoods. Violations are typically low, but residents may be inconvenienced.

Arterial Street Improvement and Signal Progression

Many times vehicles are cutting through neighborhoods because arterial streets are over capacity or traffic signals are not synchronized. Widening streets to add left turn lanes or additional through lanes or installing a signal system will improve vehicle safety and efficiency, and may reduce cut through traffic in neighborhoods.

Rumble Strips or Change in Roadway Surface

Rumble Strips across the street in the form of pavement markings can reduce speeds in advance of a crosswalk or stop sign. Changes in road surface, or rough pavement, can also be effective in reducing speeds. Both of these methods may increase noise levels

that may not be acceptable to the neighborhood. However, if locations are properly selected, noise will not be a factor.

Speed Humps

Speed Humps (Figure 2) are a raised hump in the roadway with a parabolic top, extending across the road at right angles to the direction of traffic flow. Speed humps are 3 inch high and 12 feet wide, and they reduce speeds to approximately 20 mph, and decrease cut through traffic. If speed humps are placed on streets that regularly have buses, and emergency vehicles, a flat top design can be used. These humps are 22 feet wide. **Crosswalk humps and intersection humps are also possible.**

Pedestrian Refuge Island

Pedestrian refuge islands (Figures 3 and 4) in the middle of the street provides a safe haven for pedestrians to cross the street. If placed at an intersection the island will function as a diverter to restrict through traffic. This device will reduce vehicle speeds. May require some parking removal and may inconvenience some residents. The median can be aesthetically pleasing.

Street Narrowing or Curb Extension

Street narrowing or curb extensions (Figure 5) at a critical intersection will reduce the crossing distance for pedestrians and makes pedestrian crossing point more visible to the motorist. This device will also reduce speeds since the motorist visual sight line is obstructed. Provides space for landscaping. Prevents vehicles from passing other vehicles that are turning. May require some parking removal.

Traffic Circles

Traffic Circles (Figure 6) are raised landscaped islands placed in an intersection, and their primary purpose is to reduce vehicle speeds and accidents, and they discourage cut through traffic in neighborhoods. May require some parking removal, and be restrictive to large vehicles if not properly designed.

Diverter

Diverts (Figures 7, 8 and 9) can be either diagonal or partial. A diagonal diverter is a barrier placed diagonal across an intersection. Its primary purpose is to reduce speed and cut through traffic. Landscaping is necessary to create new sight lines. A partial diverter is a barrier island at an intersection in which one direction of the street is blocked. May be an inconvenience to residents.

Street Closures

Street closures (Figure 10) are full closures of streets to eliminate cut through traffic. A cul-de-sac is required to provide a turn-a-round. May inconvenience some residents and may reduce accessibility for emergency vehicles.

Curb Radius Reduction

Curb radius reduction (Figure 11) at intersection is intended to slow turning vehicles and reduce pedestrian crossing path. The radius should accommodate a passenger vehicle. Usually a 10 to 20 foot radius will be required. Primary application is for local streets.

Chicanes

Chicanes (Figures 12 and 13) are a form of curb extension built at a 45-degree angle that alternate from one side of the street to the other. They will effectively reduce speed and decrease traffic volumes in the neighborhood.

Summary

Each traffic calming alternative has appropriate applications and uses. Each addresses the various objectives of traffic calming more or less effectively than others. Although the application of each device varies by conditions, the following is a general list of traffic calming devices by objective.

Traffic Calming Devices by Objective			
Reduce Speed	Reduce Cut-Through Traffic	Improve Safety	Improve Aesthetics
Traffic Circles	Diverter	Radius Reduction	Curb Extensions
Curb Extensions	Street Closures	Raised Sidewalks	Median Barrier
Median Barrier	Turn Restrictions	Median Barriers	Chicanes
Radius Reduction	One-Way Streets	Enforcement	Traffic Circles
Speed Humps	Partial Closures		Radius Reduction
Diverter	Speed Humps		Diverter
Chicanes	Median Barriers		Street Closure
Rumble Strips	Traffic Circles		

FIGURE 1 BENEFITS/DISBENEFITS FOR TRAFFIC CALMING ALTERNATIVES

Traffic Calming Devices (Active Controls):

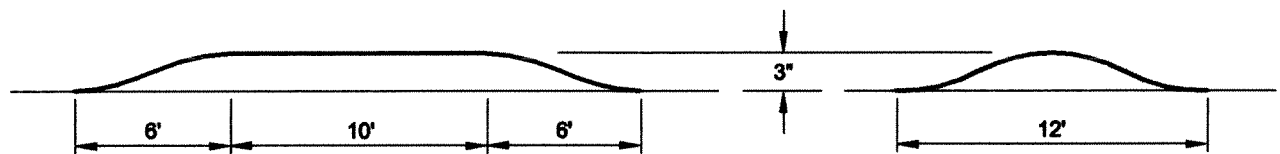
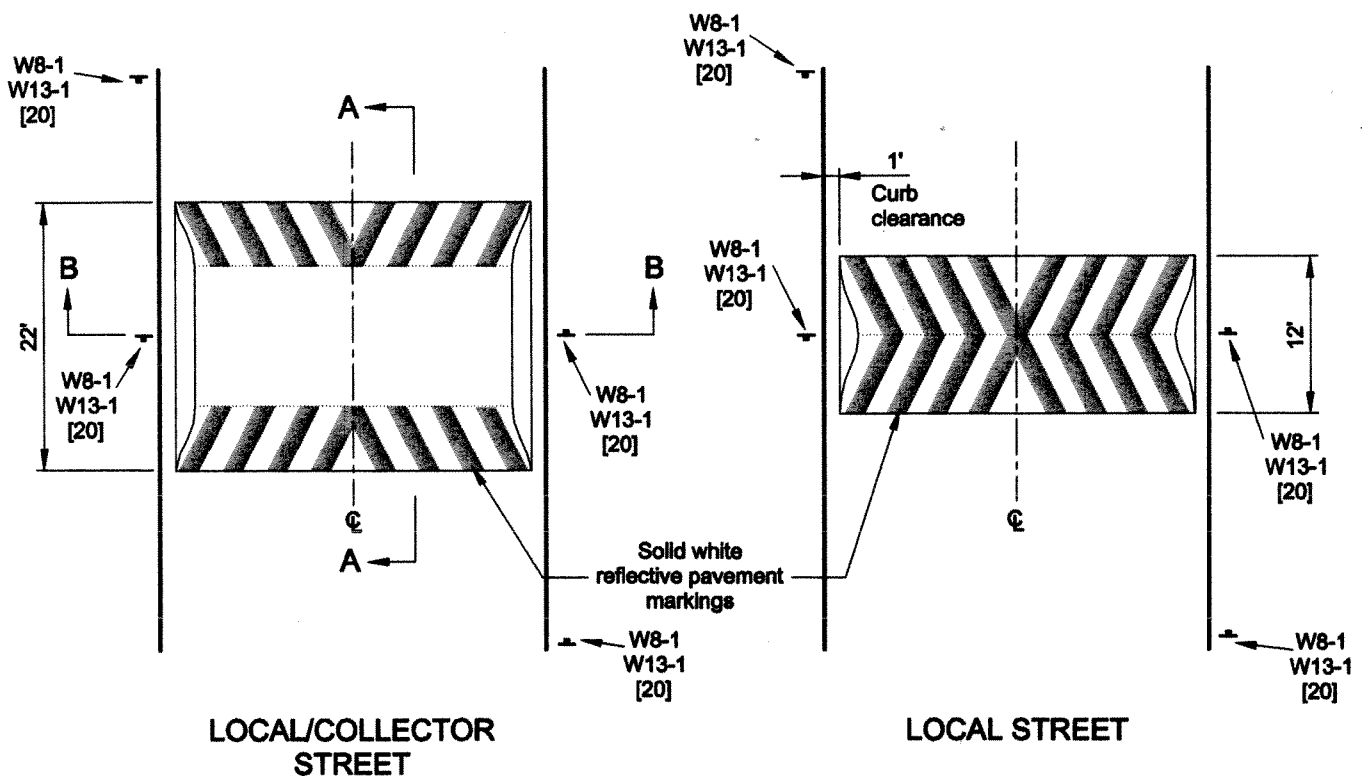
BENEFITS				
Calming Alternative	Volume Reduction	Speed Reduction	Noise & Pollution	Safety
Traffic Circle	Possible	Minor	No Change	No Docum. Problems
Curb Extension	Unlikely	Minor	No Change	Improved for Pedestrians
Median Barrier	Yes	On Curves	Decrease	Improved
Street Closure	Yes	Likely	Decrease	Shifts Accidents
Diverter	Yes	Likely	Decrease	Shifts Accidents
Speed Humps	Possible	Likely	No Change	No Docum. Problems
Rumble Strips	Possible	Possible	Increase	Possible Improvement
Radius Reduction	Possible	Likely	No Change	Improved
Chicanes	Possible	Likely	No Change	Improved

DISBENEFITS			
Access Restriction	Emergency Vehicle	Maintenance Problems	Level of Violation
None	Some Constraint	Vandalism	Low
None	No Problems	None	N/A
Right Turn Only	Minor Constraint	None	Low
Total	Some Constraint	Vandalism	Low
Left/Right Turn Only	Some Constraint	Vandalism	Low
None	Some Constraint	Street Cleaning	N/A
None	No Problems	Street Cleaning	N/A
None	Minor Constraint	None	Low
None	Minor Constraint	None	Low

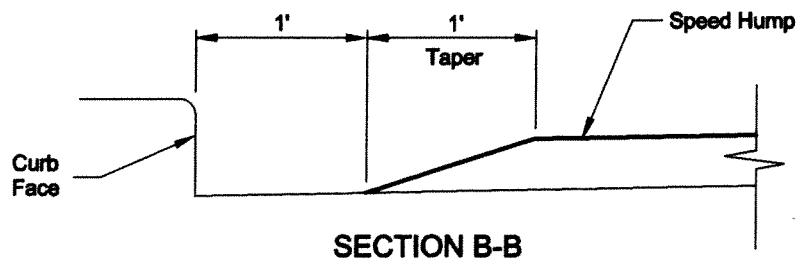
Traffic Control Devices (Passive Controls):

BENEFITS				
Calming Alternative	Volume Reduction	Speed Reduction	Noise & Pollution	Safety
Stop Signs	Possible	Minor	No Change	Improved
Improved arterial Capacity	Possible	Minor	No Change	Unclear
One-Way Streets	Yes	None	Decrease	Unclear
Turn Restrictions	Yes	Likely	Decrease	Improved

DISBENEFITS			
Access Restriction	Emergency Vehicle	Maintenance Problems	Level of Violation
None	No Problems	Vandalism	Moderate
None	No Problems	None	N/A
Restricted One Direction	Restricted One Direction	No Problems	Low
No Turn(s)	No Problems	No Problems	Moderate



Sign Descriptions:
W8-1 Bump
W13-1[20] 20 MPH



All dimensions are in feet unless otherwise noted.

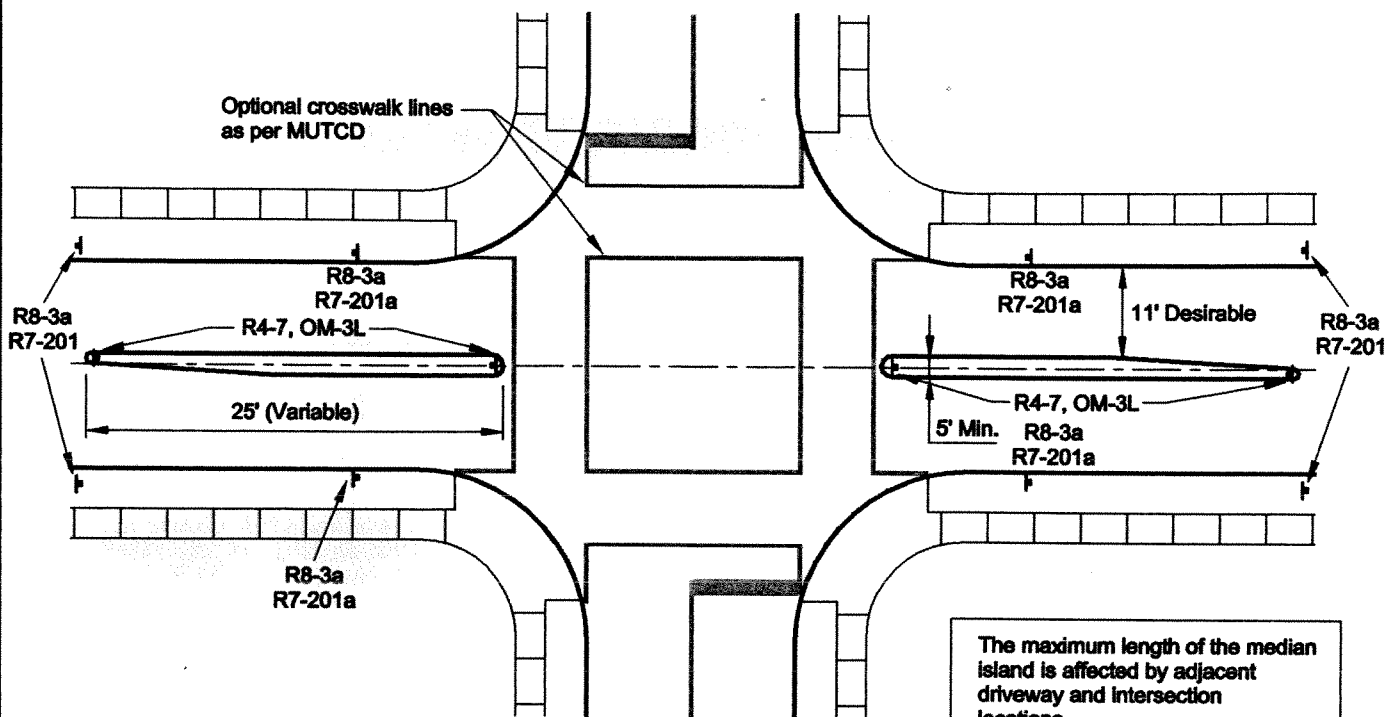
Source: Canadian Guide to Neighborhood Traffic Calming

NOT TO SCALE



FIGURE 2 - SPEED HUMPS

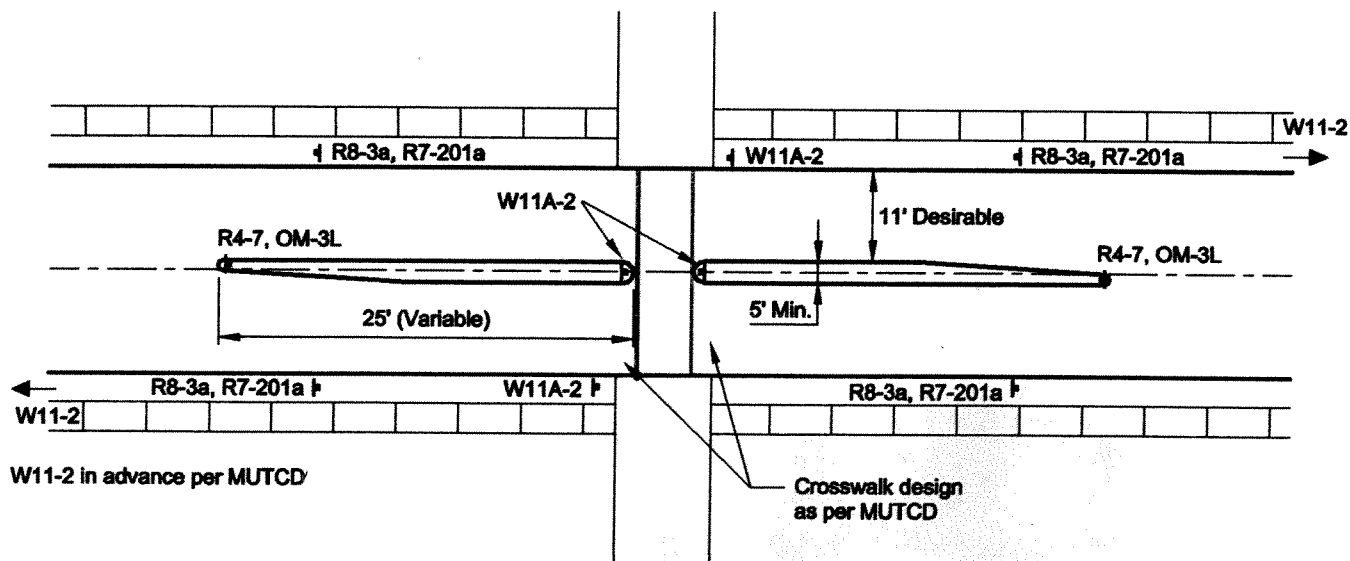




AT INTERSECTION

Sign descriptions:

W11-2	Advance Pedestrian Crosswalk
W11A-2	Pedestrian Crosswalk
R4-7	Keep Right
R8-3a, R7-201a	No Parking, Tow Away
OM-3 [R-L]	Object Marker



MID-BLOCK CROSSWALK

All dimensions are in feet unless otherwise noted.

Source: Canadian Guide to Neighborhood Traffic Calming

NOT TO SCALE



FIGURE 3 -PEDESTRIAN REFUGE ISLAND



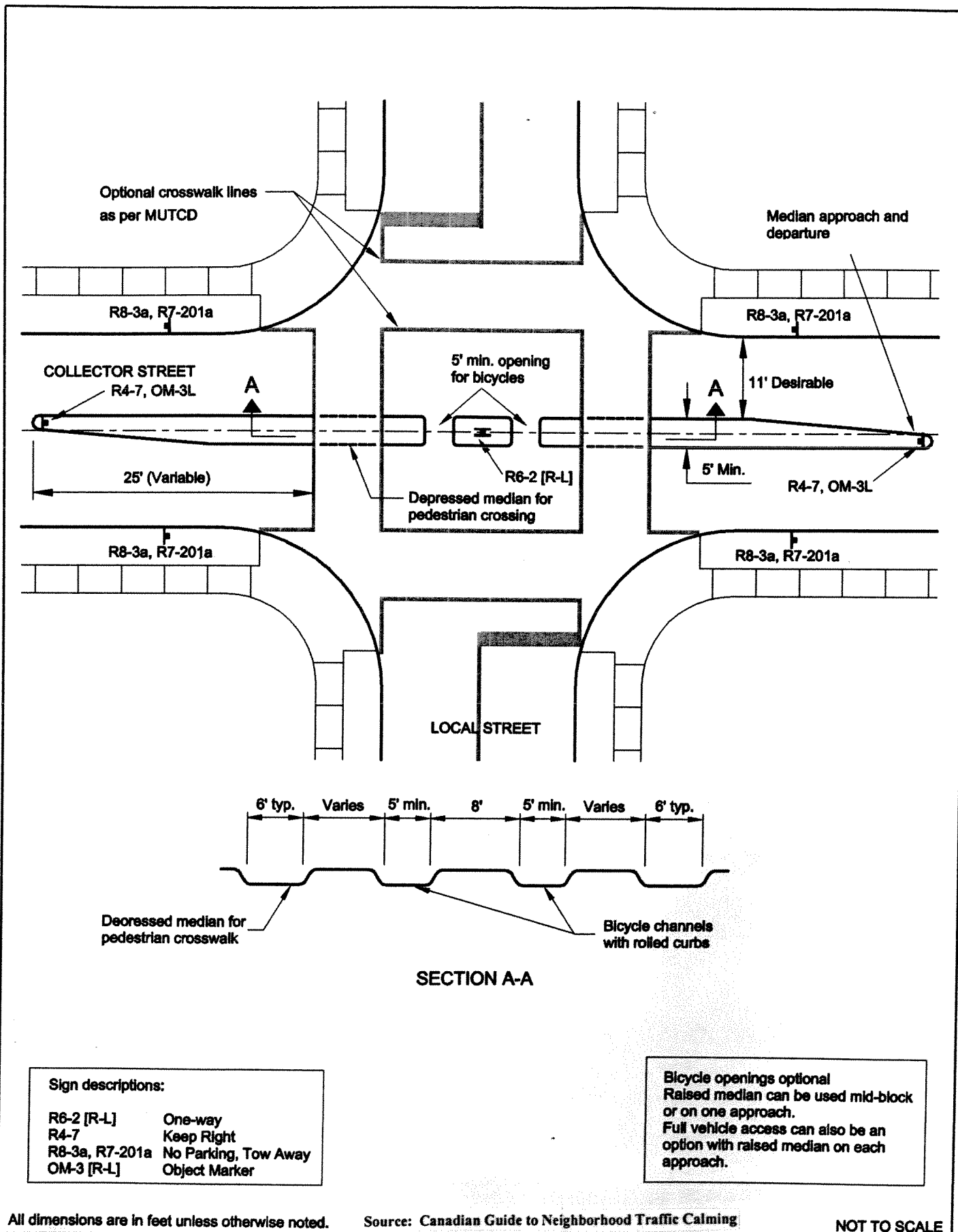
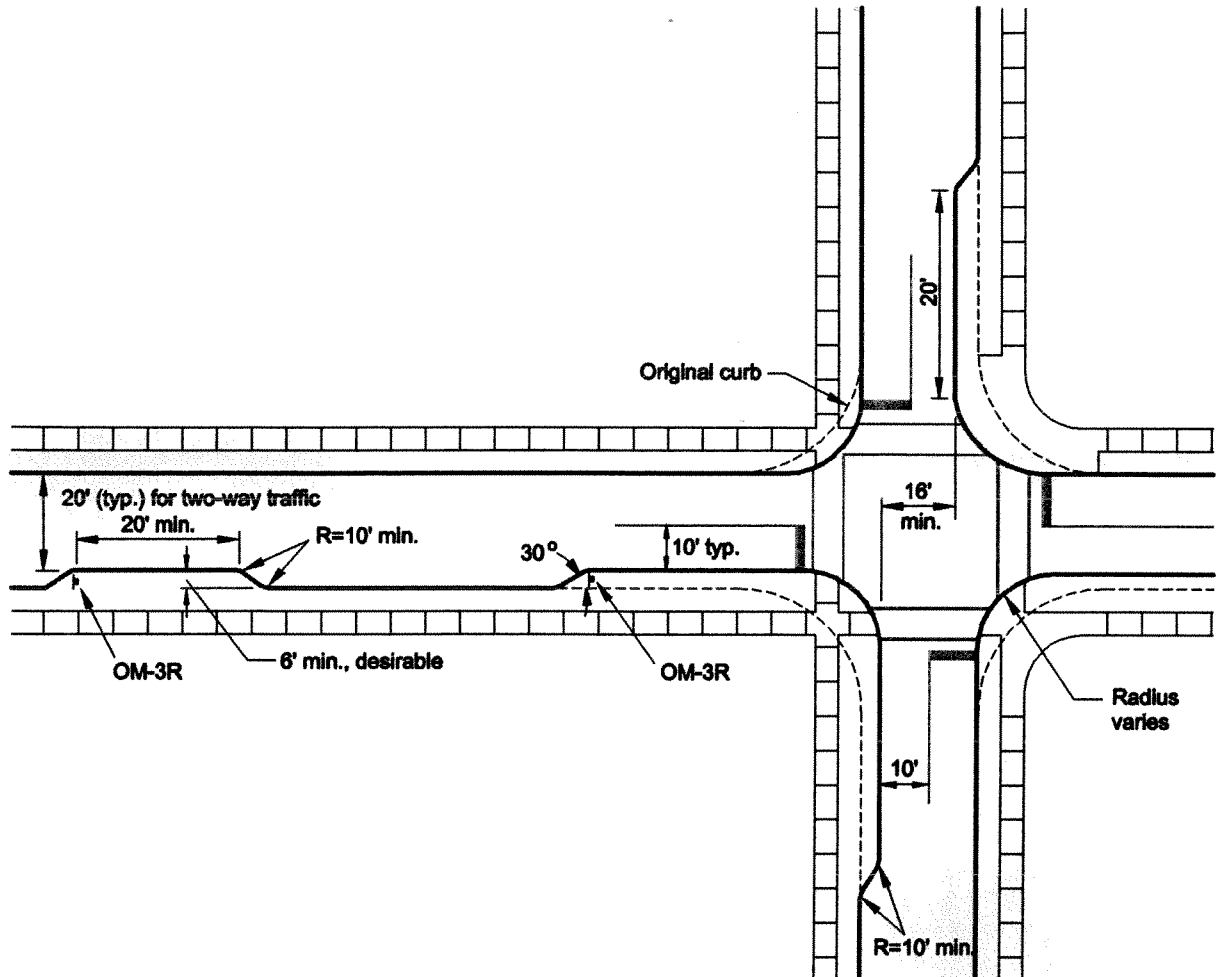


FIGURE 4 -PEDESTRIAN REFUGE ISLAND





Sign Descriptions:

OM-3R Object Marker Right

- Intersection radii should accommodate design vehicles applicable to street.
- Mid-block curb extensions could be combined with crosswalks where possible.
- Length of curb extensions must recognize site conditions, e.g., driveway locations.
- Vertical delineation other than Object Markers (OM-3R) may be more appropriate. Possible alternatives include bollards, landscaping, and Type 2 Object Markers.

All dimensions are in feet unless otherwise noted.

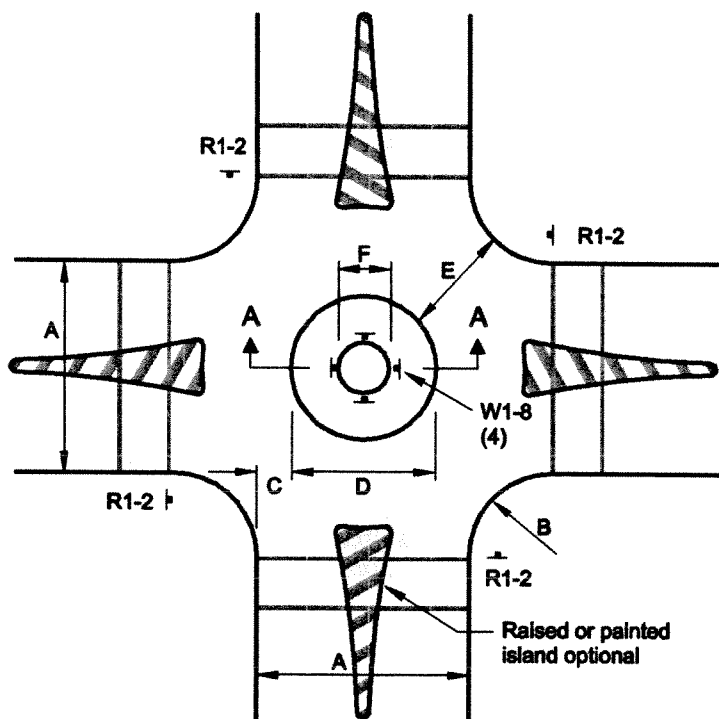
Source: Canadian Guide to Neighborhood Traffic Calming

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FIGURE 5 -CURB EXTENSION





Sign descriptions:

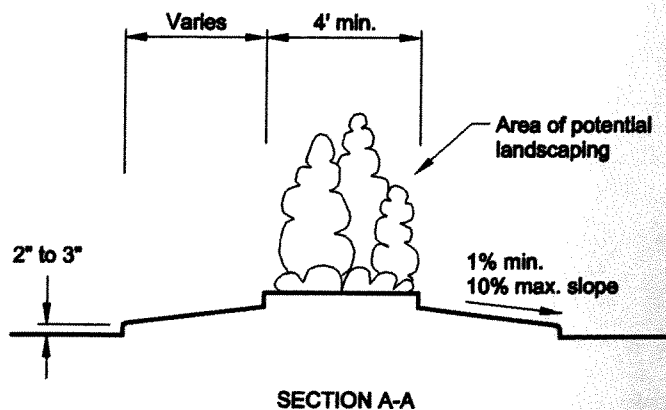
R1-2 Yield
W1-8 Chevron Alignment

Dimension Chart for Varying Roadway Widths				
A Roadway Width	B Curb Return Radius	C Offset Distance	D Circle Diameter	E Minimum Opening Width
20'	15	6	9	16
	20	5	10	18
	25	4	12	19
24'	15	6	12	16
	20	5	14	18
	25	4	15	19
30'	15	5	20	18
	20	4	22	19
	25	3	24	20
36'	10	5	27	17
	15	4	28	19
	20	3	30	21
40'	10	5	30	17
	15	4	31	19
	20	3	33	21

Legend:

- A Roadway Width
- B Curb Return Radius (15' min.)
- C Offset Distance (5' max.)
- D Circle Diameter
- E Opening Width (See table above)
- F Raised Island Diameter (4' min.)

- Minimum opening width to be provided to all crosswalks.
- A deflection triangle raised or painted on the pavement on each approach to the traffic circle may be appropriate.



All dimensions are in feet unless otherwise noted.

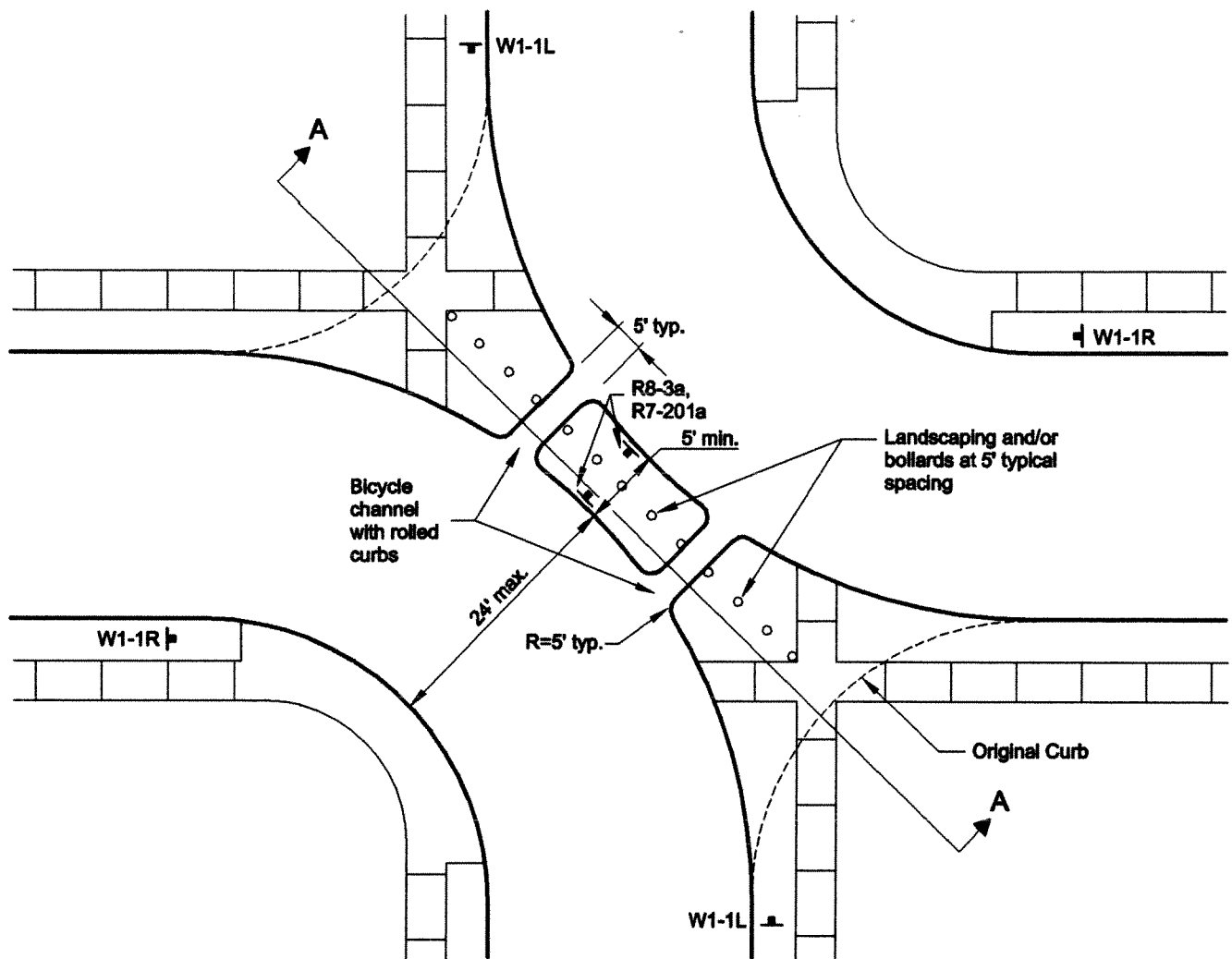
Source: Canadian Guide to Neighborhood Traffic Calming

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FIGURE 6 - TRAFFIC CIRCLE

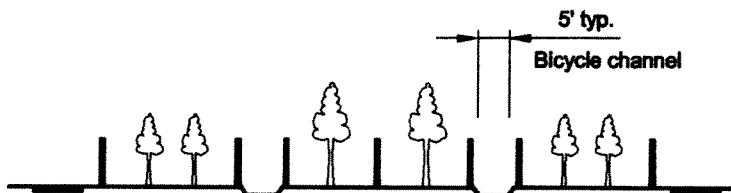




Sign descriptions:

W1-1 [R-L] Turn Right / Left
 R8-3a, R7-201a No Parking, Tow Away

- Depending on pedestrian demand, the diverter design can be modified to accommodate a sidewalk along its length. Landscaping and/or bollards are to be retained.
- Emergency vehicles can be accommodated by use of breakaway or lockable bollards, or lockable gates.



SECTION A-A

All dimensions are in feet unless otherwise noted.

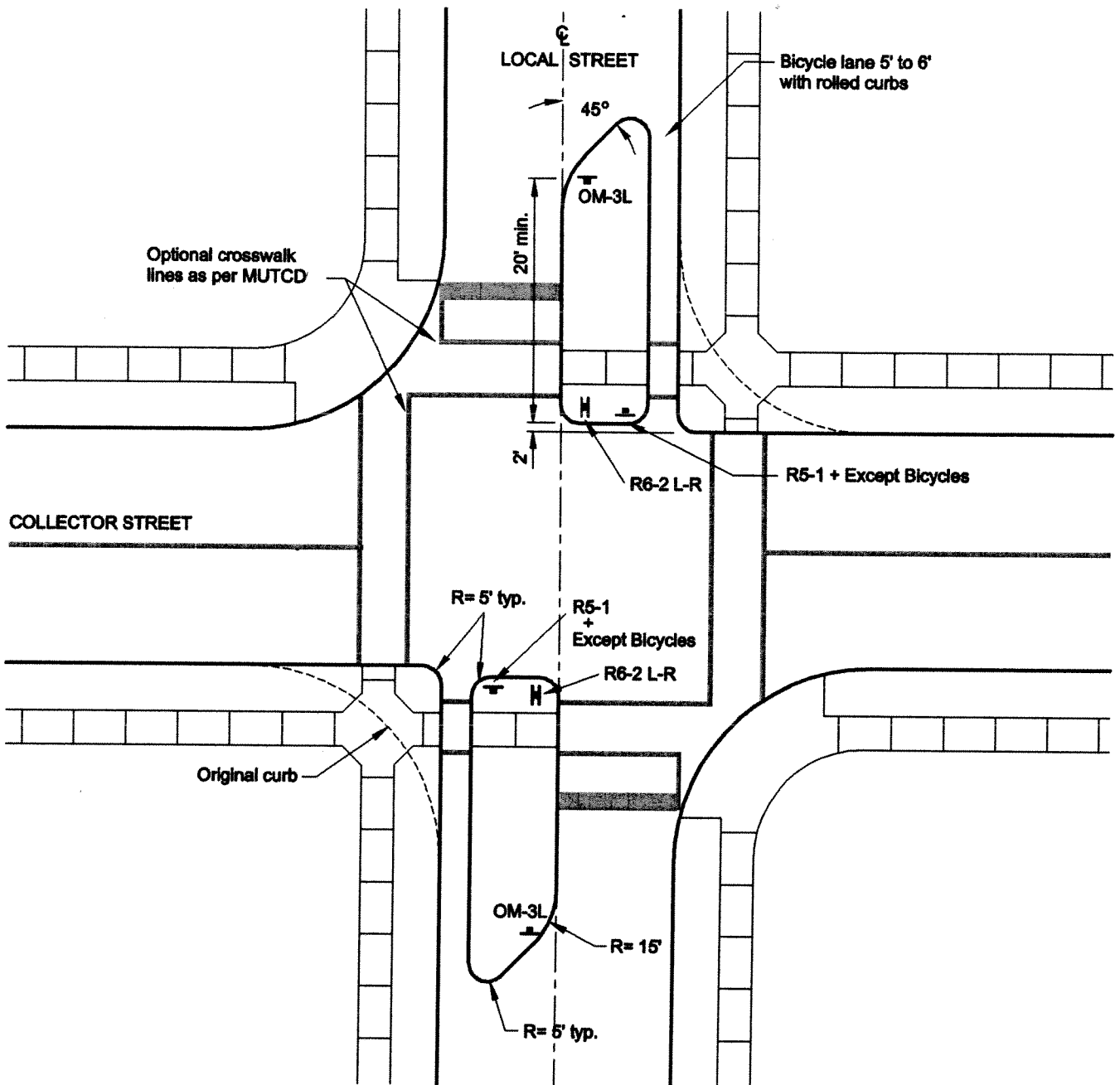
Source: Canadian Guide to Neighborhood Traffic Calming

NOT TO SCALE



FIGURE 7 - DIAGONAL DIVERTER





Sign descriptions:

R6-2 R-L	One-way
R5-1	Do Not Enter
Except Bicycles	Except Bicycles tab
OM-3 R-L	Object Marker

All dimensions are in feet unless otherwise noted.

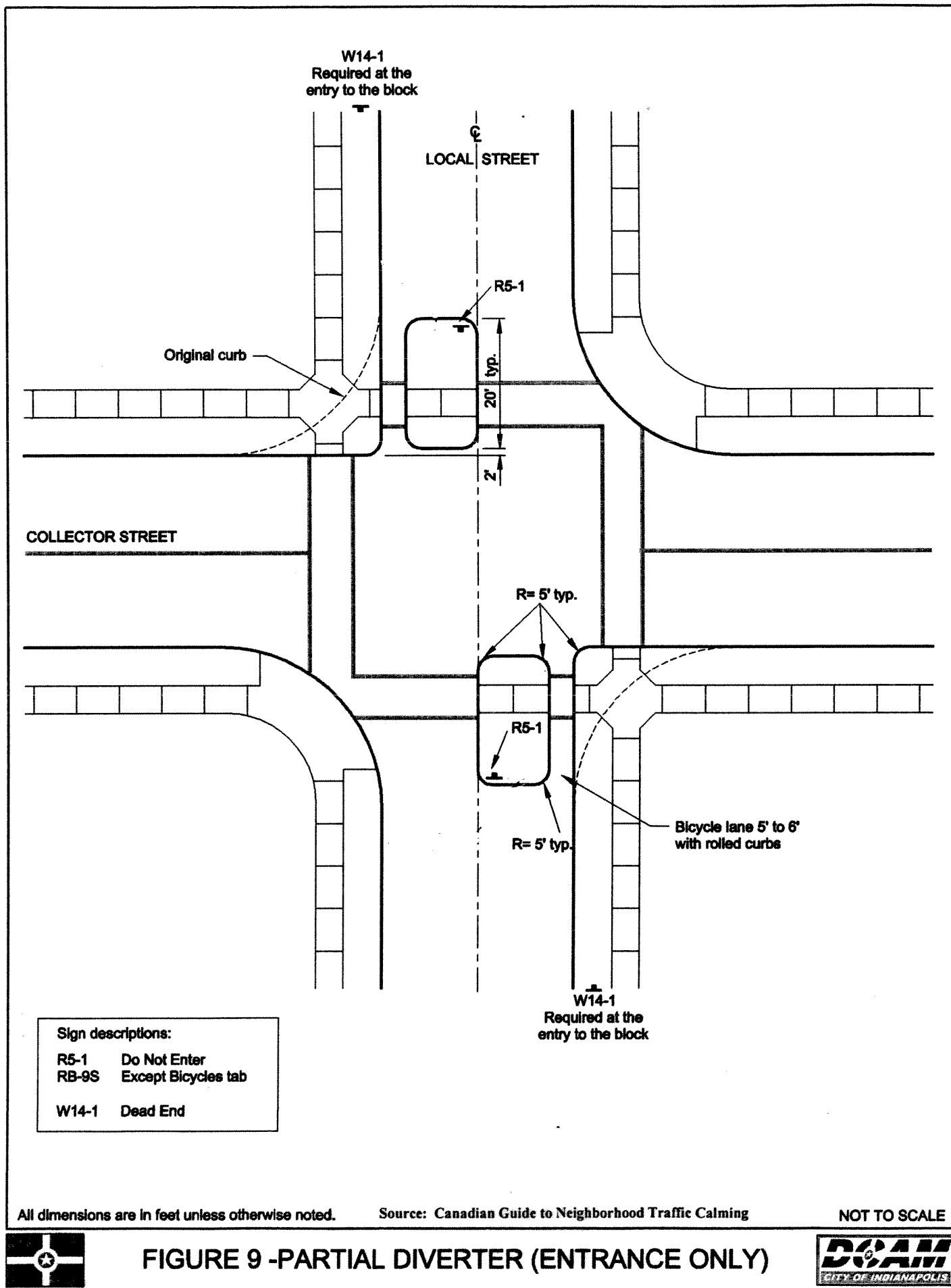
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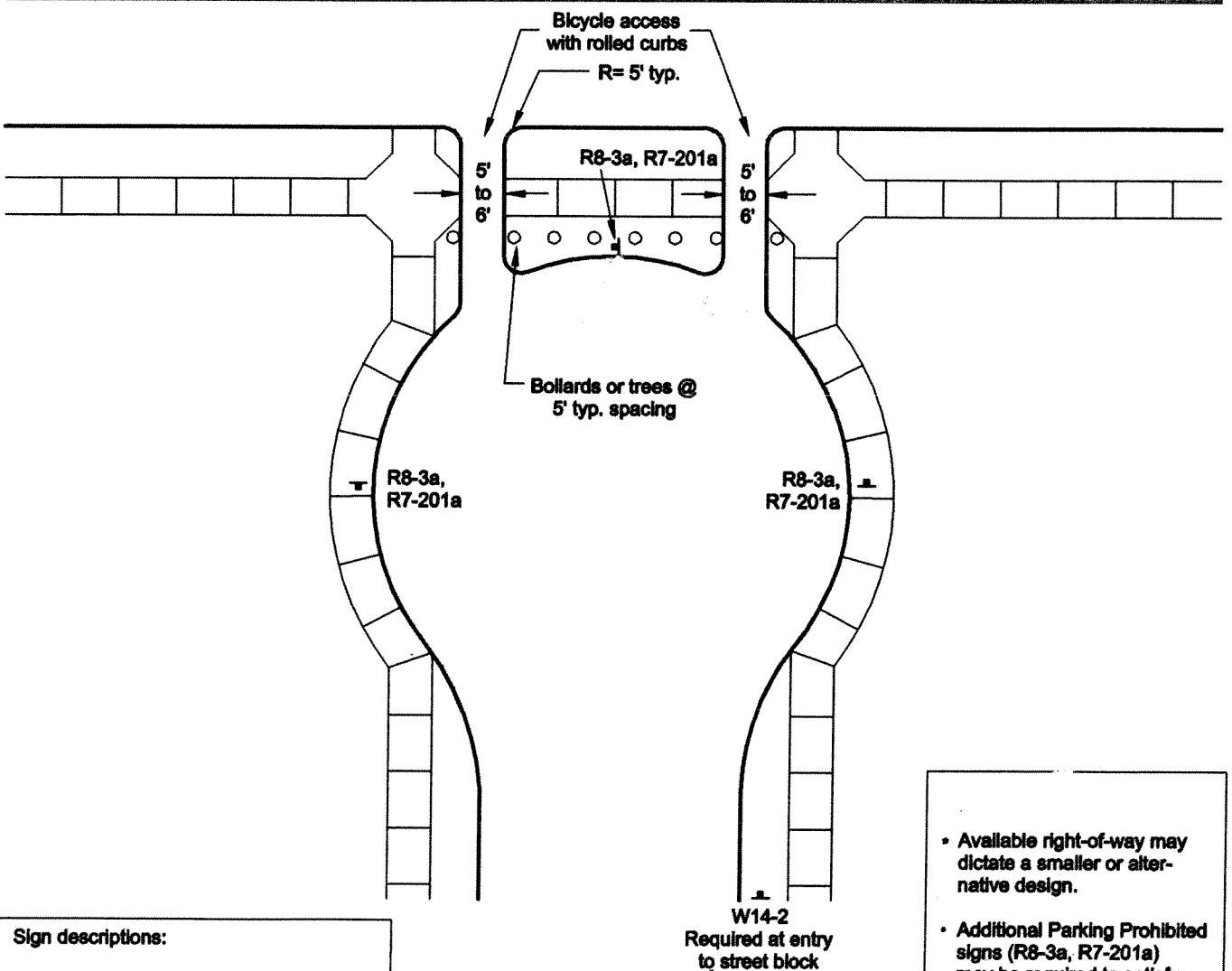
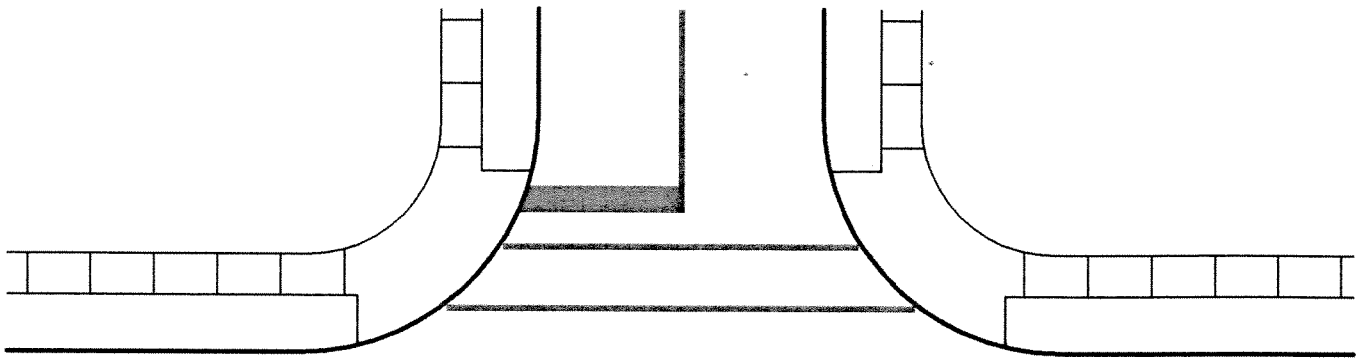
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FIGURE 8 -PARTIAL DIVERTER (EXIT ONLY)







Sign descriptions:

R8-3a, R7-201a No Parking, Tow Away
W14-2 No Outlet

- Available right-of-way may dictate a smaller or alternative design.
- Additional Parking Prohibited signs (R8-3a, R7-201a) may be required to satisfy local convention.

All dimensions are in feet unless otherwise noted.

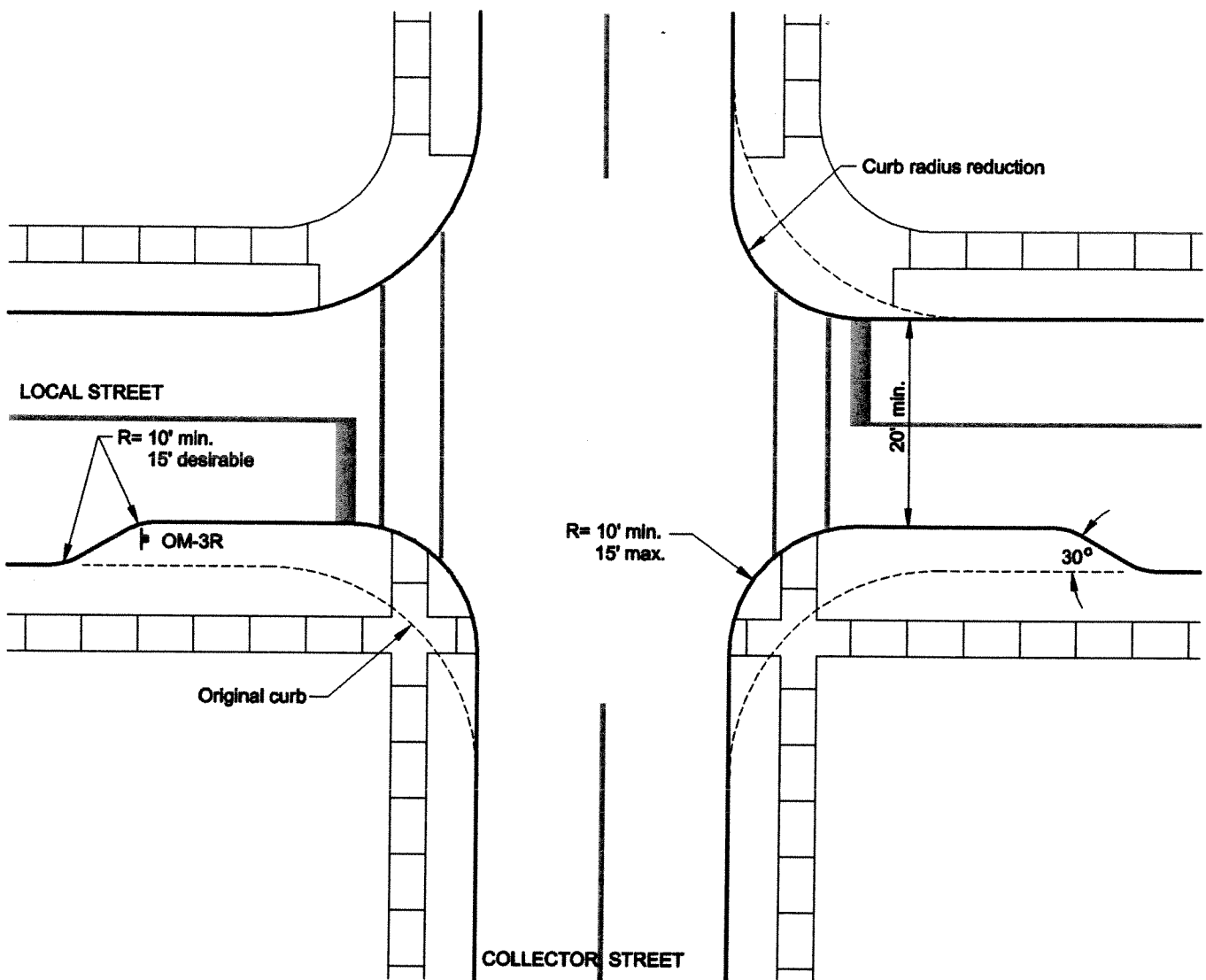
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FIGURE 10 -STREET CLOSURE (CUL-DE-SAC)





Sign descriptions:

OM-3R Object Marker

- Curb radius reductions should not be applied on primary emergency vehicle routes.
- Depending on local climate and preference, vertical delineation other than the Object Marker (OM-3R) may be more appropriate. Possible alternatives include bollards, landscaping, and Type 2 Object Markers.

All dimensions are in feet unless otherwise noted.

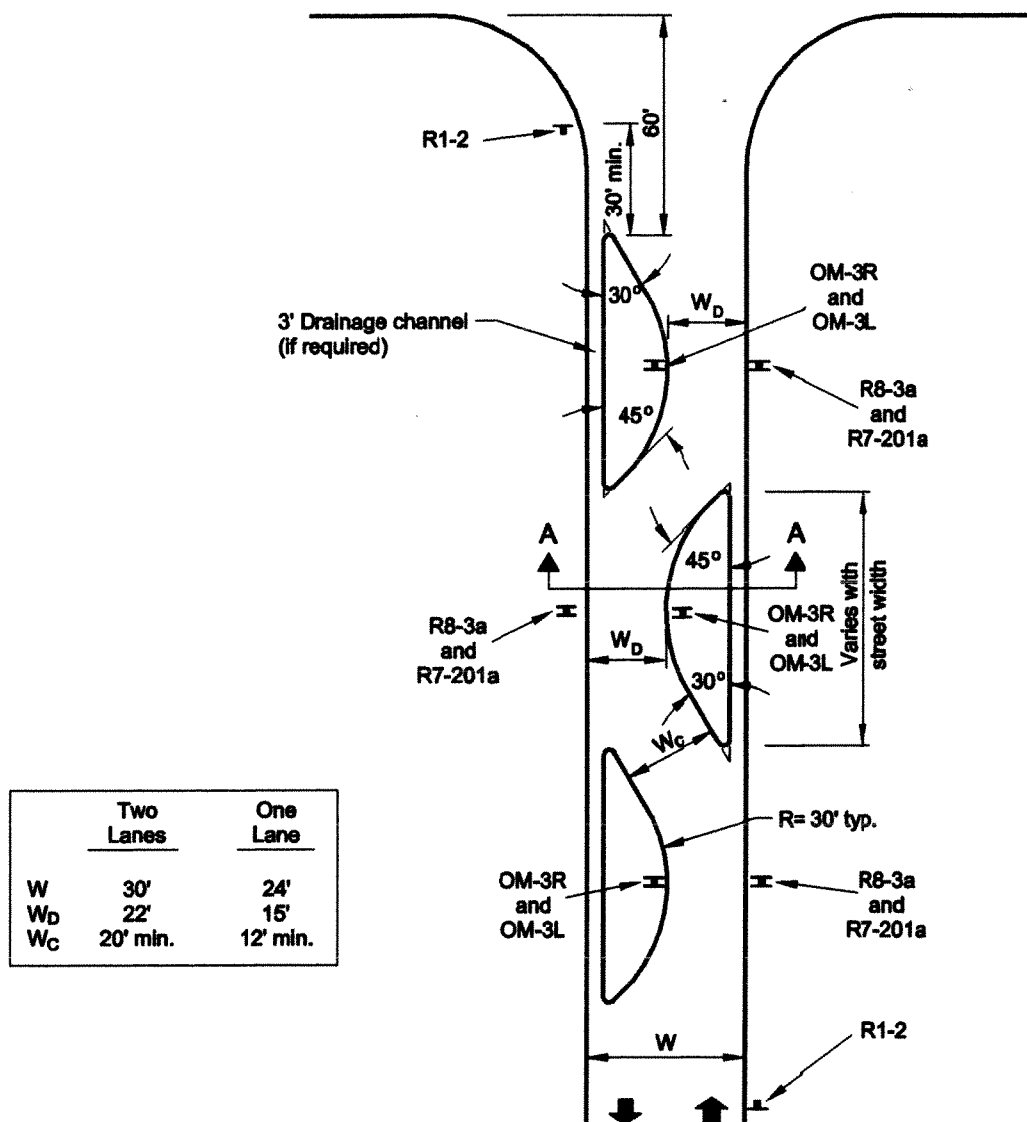
Source: Canadian Guide to Neighborhood Traffic Calming

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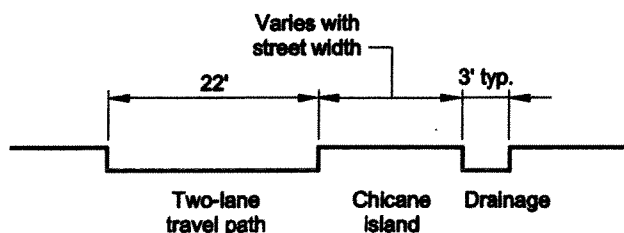


FIGURE 11 -CURB RADIUS REDUCTION





	Two Lanes	One Lane
W	30'	24'
W _D	22'	15'
W _C	20' min.	12' min.



SECTION A-A

Sign descriptions:

R1-2	Yield
R8-3a R7-201a	No Parking Tow Away
OM-3 [R-L]	Object Marker

- The travel path through the chicane can be one lane or two lanes as noted.
- Spacing of chicane segments dependent on site considerations, e.g., driveway locations.
- Island plantings should not obscure driver's view of chicane traffic.
- Additional R8-3a, R7-201 signs may be required to satisfy local convention.
- Bicycles are to use the same path as motor vehicles, not the drainage channel.
- Depending on local climate and preference, vertical delineation other than Object Markers (OM-3 [R,L]) may be more appropriate. Possible alternatives include bollards, landscaping, and Type 2 Object Markers.

All dimensions are in feet unless otherwise noted.

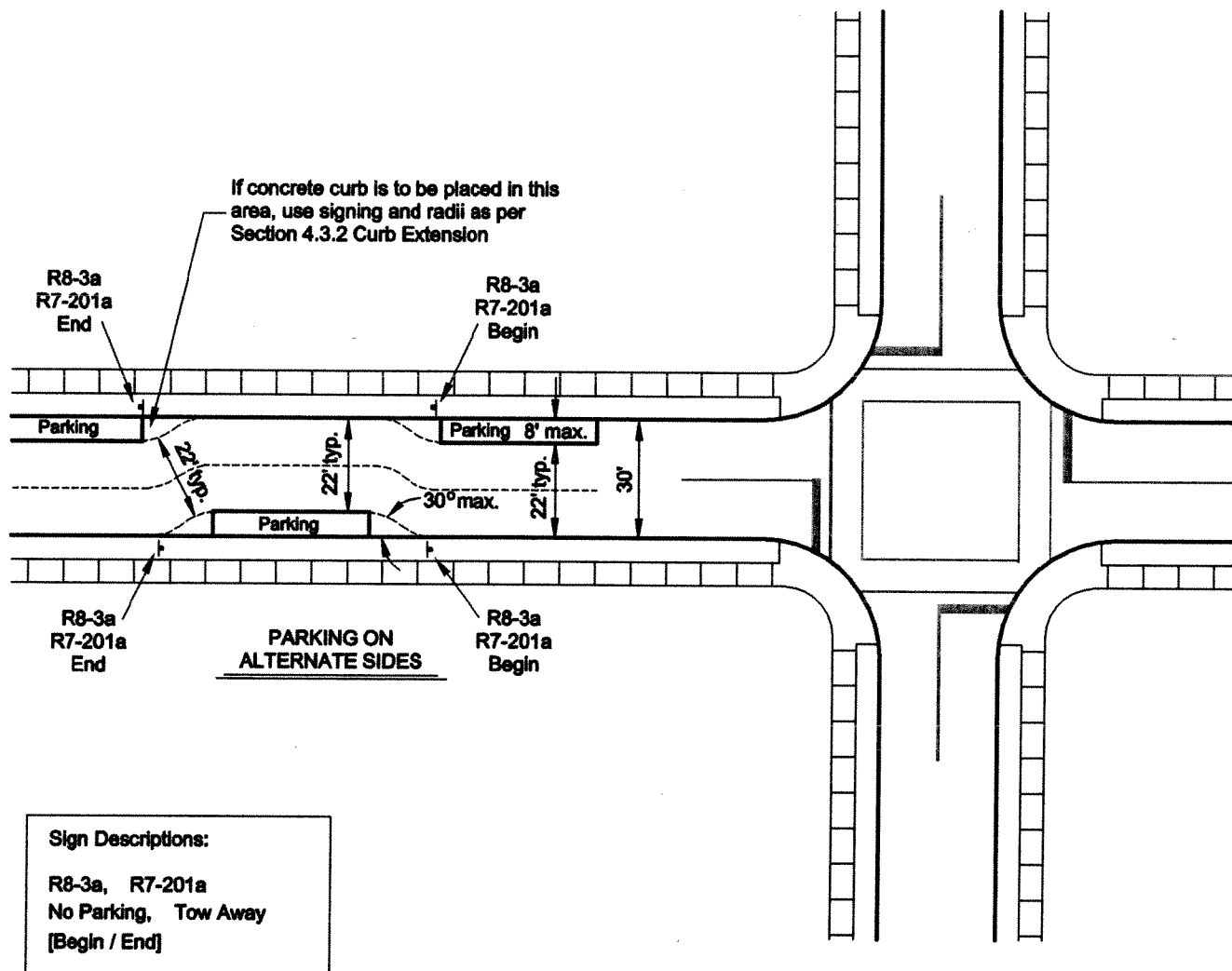
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FIGURE 12 -CHICANE





All dimensions are in feet unless otherwise noted.

Source: Canadian Guide to Neighborhood Traffic Calming

NOT TO SCALE



FIGURE 13 -ON-STREET PARKING (CHICANE)



4. SPEED HUMP– DESIGN AND CONSTRUCTION GUIDELINES

Purpose

The purpose of this recommended practice is to provide guidelines for the design of speed humps. They consist of raised pavement constructed or placed in, on, and across or partly across a roadway. **For the purpose of this recommended practice, speed humps are defined as a roadway geometric design feature whose primary purpose is to reduce the speed of vehicles traveling along the roadway, and decrease the number of cut through traffic.**

Design

Dimensions and Cross Sections - The parabolic speed hump as shown in Figure 14 should be used. The 3" hump can be expected to cause speed of from 20 to 25 mph at the hump, with a 4" hump creating crossing speeds of 15 to 20 mph. Humps should not exceed 4" in height, and a 3" height is generally considered more acceptable. The flat top design (22 feet) has the same approach dimensions of 6 feet with 10 feet in the middle. These humps are used on street that may have buses and emergency vehicles.

Spacing and Location - Current practice indicates that speed humps within a series are normally placed from 200 feet to 750 feet apart (Figure 15).

Traffic Signs - The warning sign used for speed humps is the standard MUTCD (Manual on Uniform Traffic Control Devices) W8-1 "Bump" warning sign (Figure 16). The sign is installed in advance of the hump and at the hump. Advance warning signs should be located based on MUTCD and should be located based on MUTCD Table II-1, "A Guide for Advance Warning Sign Placement Distance". Advisory speed plates are also required.

In certain instances it may be justified to install special attention flags or flashing lights to speed hump warning signs. These devices are sometimes used in the initial installation period or in locations where unusual combinations of roadway or vehicle operating conditions present special conditions that warrant additional warning devices.

Markings - Special markings on the hump should be installed in conformance with MUTCD guidelines, and as shown in Figure 17.

Installation Angle - Speed humps should be installed at a right angle to the centerline tangent of the roadway.

Drainage and Utilities - Speed humps should be installed with appropriate provisions made for roadway drainage and utility access, or at the crest of a vertical curve. Humps should generally not be located over or contain maintenance access holes, or be located adjacent to fire hydrants.

Ideally, a hump should be installed at a location immediately on the downside of an existing drain inlet. If this is not feasible, the construction of a bypass drain or other treatment to route water around the hump should be considered.

Coordination with Street Geometry - A thorough on-site analysis of roadway geometrics should be performed to ensure that speed humps would not be introduced at a critical point in the roadway system, e.g., a severe combination of horizontal, vertical curvature and / or street gradient. **Speed humps should normally be considered only for use on streets with grades of 8 percent or less approaching the hump.**

Coordination with Traffic Operations - Speed humps should not be installed within 250 feet of a traffic signal or within an intersection or driveway. This suggestion is not intended to apply to use of a raised intersection as a valid traffic management technique.

Location Elements - If possible, speed humps should be installed at a street light to improve night time visibility. Likewise, if possible, speed humps should be installed near property lines for aesthetic reasons.

Construction

The construction of the speed hump can be asphalt, pre-cast concrete sections, concrete, or brick / concrete pavers. Experience has shown that the use of soft material will result in deformation as the top of the hump is pushed in the direction of the traffic stream. This will vary per location depending on the daily traffic volume and vehicle types.



NOT TO SCALE



FIGURE 16 -SPEED HUMP SIGNS

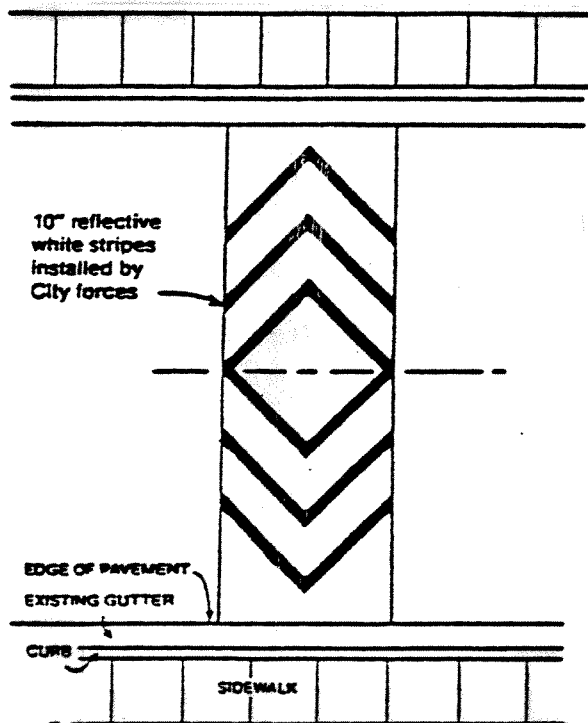
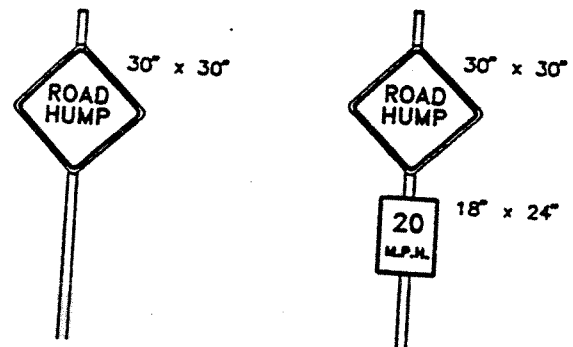
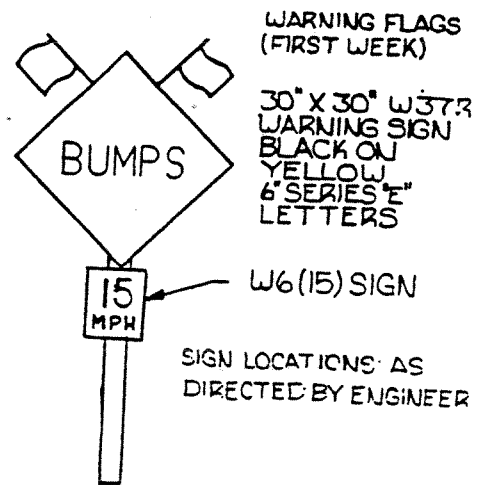


FIGURE 17 -SPEED HUMP MARKINGS

All dimensions are in feet unless otherwise noted.

NOT TO SCALE

